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ABSTRACT

In light of recent advances in the field of microcomputers and the general availability of inexpensive means of storing and transmitting information, this paper discusses the potential educational uses of computers and considers the role of computer technology and "technological literacy" in higher education. By way of example, the paper describes the advantages realized by North County Community College (NCCC) through the acquisition of computer resources and outlines the development of their computer laboratory. Next, several possible uses of microcomputers in social science research and instruction are identified, with emphasis given to data analysis software packages, simulations, and word processing possibilities. The paper then illustrates the potential educational benefits of teaching literacy skills with the aid of computers, stressing their greater editing capabilities and ability to store written material; their possible uses for aiding learning disabled students; their use in vocabulary and grammar exercises; and the potential for improving student composition through a change in the context of instruction. After pointing to the ways in which teaching literacy skills through computer-assisted instruction increases students' familiarity with computers, a proposal to make "computer literacy" a requirement for NCCC graduation is outlined. (HB)

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COMPUTER LITERACY:

THE NEW MANDATE FOR GENERAL EDUCATION IN THE 80'S

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In thinking about general education, the question arises, "Are the general education requirements the same today as they were twenty, fifty, or one-hundred years ago?" A recent issue of the Chronicle of Higher Education contained a review of a speech by Nannerl O. Keohane, President of Wellesley College, where she argued that the general education requirements of the 1980's will need to include a component she labeled "technological literacy". (Chronicle of Higher Education; Watkins, 1982.) If the article reporting on the speech is accurate, Ms. Keohane is arguing for more technological information to be included as a requirement for a good solid education, liberal arts or otherwise. In a subsequent issue of the Chronicle of Higher Education (Feb. 10, 1982), a colleague expresses dismay that Ms. Keohane, as an administrator of a liberal arts institution, would betray the belief in a great emphasis being placed on "values" and the "traditional" liberal arts curriculum. The two positions would seem to represent well the controversy that will surely rage on in discussions about general education. The authors of this paper sympathize with Ms. Keohane's point of view. Moreover, we feel that support of "technological literacy" is not antagonistic to education that teaches "values" and the communications skills important to a liberal arts curriculum.

It is our belief that technological advances in the field of microcomputers make it more critical than ever that all students and faculty understand the implications of computers and their impact on society.

The following quotes are but a few examples from what is being written about this nation's most important component of our high technology industry, the microprocessor.

"As the dawn breaks, the computers will pervade our lives in ways we are not yet capable of imagining." (Sandra M. Long, "The Dawning of the Computer Age: An Interview with Ronald Palamara", Phi Delta Kappan, January, 1982, pp. 311-313.)

"It was supposed to have been the atomic age, but it became the computer age." (Linda Wyrick Winkle and Walter M. Mathews, "Computer Equity Comes of Age", Phi Delta Kappan, January, 1982, pp. 314-315.)

"Sales of small computers are increasing at a rate of 50% to 60% a year. More than 1 million have already been bought, at prices ranging from $500 to $10,000. By 1985, small computers are expected to be a $9 billion-a-year business...." (Alexander Taylor, "Small-Computer Shootout", Time, March 2, 1981, pp. 68-69.)

"New information technologies -- computers, microprocessors, video recording devices, and inexpensive means of storing and transmitting information -- are creating a revolution as important as the invention of printing." (Arthur S. Melmed, "Information Technology for U. S. Schools", Phi Delta Kappan, January, 1982, pp. 308-311.)

Community colleges, and higher education in general, in a time of financial crisis, seem to be faced with a major crisis. Our society is accepting more quickly than expected the process of becoming computerized. The miracle "chip" has made it possible for industry to provide personal or microcomputers for several hundreds of dollars that exceed the power of huge room-sized computers just fifteen years ago. Businesses, large and small, and individuals are buying these small computers by the thousands. This phenomenon seems to be caused, in part, by people being convinced by the computer manufacturers that software packages (programs) are available that will allow the average, non-technical person to keep a set of books, establish a computerized inventory system, produce letters and documents, and manage the affairs of everyday living. And, although there are problems with much of the software available, the manufacturers' claims seem to be true.

An Emphasis on Microcomputer Literacy

North Country Community College is a small, relatively new, community college that for various reasons did not have any computer resources, either through time-sharing or on-campus equipment, as late as the spring of 1980. The rapid movement to a computerized society was therefore particularly alarming to us at the college. In an effort to address the changing needs of the marketplace with regards to computer literacy, the college therefore applied for and received in 1980 a grant to equip a laboratory with microcomputer hardware and software packages for business and secretarial science applications. As a consequence, a microcomputer lab was equipped with 15 Commodore Pet 32K microcomputers, one Apple 48K microcomputer, and a considerable number of business and educational software packages.

Since the establishment of this computer lab a little over one year ago, the college's community has become increasingly absorbed in taking advantage of the many applications that a small personal/microcomputer can provide. Faculty are helping to manage their instruction by using the computer to keep track of student progress and compute student averages to assist in the assignment of final course grades. Administrators are using the computers to help develop and maintain area and departmental budgets and to aid in the use of program cost models for long range planning purposes. Secretaries are using the computers for word processing purposes which include information storage, maintaining current mailing lists, original typing and "personalization" of form letters, and for helping to ease the burden of correcting and redrafting written materials as they are developed and revised.

It should be pointed out that the college has simultaneously been in the process of installing a mini-computer system that will provide a complete

management information system that will support the administrative functions of the college. Even with this development of a management information system, the professional staff of the college has recognized the "power" of the personal computer and anticipates an ever increasing use of the small computer due to their ease of operation, avoidance of depending on a programmer and computer department to meet short deadlines, and the advantage of being able to manage many individual informational needs that would be too expensive to consider as part of the larger management information system.

Microcomputer Uses in the Social Sciences

A 32K (kilobytes) microcomputer is not a toy. Just over a decade ago, industry was still using computers that filled good-sized rooms and had memory capacities less than the 32K that is currently available for almost all personal computers at costs from $800 to $1200. The implications for the social sciences are numerous.

First, the microcomputers can be helpful in conducting research. Although the Statistical Package for the Social Sciences (SPSS) is not currently available for microcomputers, there is plenty of highly sophisticated data analysis that can be done with these machines. The second author just received a disk for his machine that included the following statistical programs: Mann-Whitney U test, mean variance, standard deviation, chi-square test, student's t-distribution test, analysis of variance, linear correlation coefficient, linear regression, multiple linear regression, and others. All this and more were purchased for less than twenty dollars, and the programs are easier to use than SPSS! With microcomputers, almost every social science instructor and student could become a "researching" social scientist. Although our subject matter will

not become any easier to research, our attempts to "teach" the social sciences by allowing people to do social science research may produce more capable researchers in the future.

Second, and perhaps most exciting, is the limitless horizon for simulations. Simulations allow us to emulate the attributes and characteristics of real life situations, without having to suffer the risks of real life endeavors. In a child psychology class, it will be possible to have a microcomputer simulation of what it's like to be a parent with five children and try out different theoretical models of reinforcement (e.g., fixed interval vs. variable ratio). In sociology, a student could study the effects of various population projections on current and future food supplies. Economic projections are easily programmed into simulations. The possibilities are limitless.

A third major application for the social scientist is in the area of word processing. Several years ago, word processing meant typing a paper on an electric typewriter. Later, it meant doing so on a memory typewriter or a magnetic card typewriter. Today, in the secretarial sciences, the state of the art consists of stand-alone word processors or microcomputers with word processing software packages. The advantages to these new devices are numerous and have been quickly grasped by newspapers and authors accustomed to pounding keys while consuming quarts of "white-out" material. Alvin Toffler is one of those who has found his time from rough draft to finish shortened because of a microcomputer and word processing software. (Alvin Toffler, "Toffler talks." (An interview). Mechanix Illustrated Home Service Series, Oct. 1980, pp. 18-20.) So what does this mean for the social science instructor?

For this paper, a microcomputer was used to go from first draft, through editorial changes, to a second draft, all in a few short hours. In short,

the microcomputer saved the authors and their supporting institution a lot of time and money, while making writing easier and more enjoyable. The word processing microcomputer allows text-editing of a magnitude heretofore unheard of.

What social science instructor has not fallen asleep at night dreaming of the horribly typewritten or handwritten papers just read? If the microcomputer can be of assistance in the writing of the professional, it can also be helpful to the writing of students. In some junior and senior high schools, teachers are encouraging their students to write their papers on microcomputers with word processing capabilities. As was reported at a recent microcomputer conference, "...rather than a student spending ninety percent of the time on mechanics of writing (i.e., the handwriting) the microcomputer with word processing allows for perhaps eighty percent of the time to be spent creating and only twenty percent in the mechanics of writing." Students seem much more willing to go back and make corrections when it involves touching a few keys to rewrite or rearrange paragraphs. Each of us, on more than one occasion, have known about an error in a paper being sent out and just didn't have the heart (or the courage) to ask the secretary to type it again. Perhaps students are the same way.

Literacy Through Computers

Let's take the phrase "computer literacy" and turn it around slightly to read "literacy through computers". With this transformation, we are pointing to one of the potential educational benefits of computer assisted instruction (CAI). While the main advantages of computer literacy are becoming increasingly evident, several developments in literacy-through-computers are creating a minor revolution in the teaching of reading and writing. On the community

college level, traditional literacy skills, we are finding, can be learned more effectively through the use of microcomputer technology.

There are two fundamental applications of CAI in literacy skills teaching. One provides an alternative means of composition. Using word processing software, students "write" their themes, essays, reports, and paragraphs on the microcomputer. The second utilizes software programs for learning exercises in vocabulary, grammar, and sentence building. The advantages that these applications offer include the following:

1. Change in the instructional context. By the time students leave high school, they have written and submitted thousands of handwritten (often dog-eared) compositions. It is understandable that they become insensitive to the impressions and implications of format. Also, many of our community college students have experienced negative feedback on these compositions for so long, that the entire process has become an exercise in anticipated non-success. For these students, "changing the context" has become a useful teaching strategy. We try to structure writing so that it does not resemble the patterns of many, perhaps dreary semesters of relative failure.

Here the microcomputer offers a clear service. Students sitting at the keyboard, watching their words appear on the screen, become excited by the possibilities. We have noticed an interest in and respect for composition work that indicates that writing is a different activity from the one many of our students have known.

2. Editing capabilities. The editing function of word processing software has made revision a real part of the composing process. As one of our instructors has observed:

> Many of our students write weak papers because they do not include rewriting in the process with which they write. They tend to write a paper once and consider it finished forever. The students who used the computer last semester engaged in more

> rewriting than they otherwise did. They did so, I believe, because the computer allows them to easily manipulate and alter the context of their papers.
>
> (Ed Stodola, Freshman Composition Instructor)

Students have learned to move that cursor around, to change, correct, add, and delete. And, the anticipation of the printed copy seems added incentive to the rewriting process.

3. Legible final copies. Students and instructors have appreciated the increased legibility of computer-printed papers. For the most part, we have used the dot matrix printer, for reasons of economy. For special projects, the letter quality printer is utilized. In either case, the student submits a paper that can be read, free of the idiosyncrasies of handwriting. Instructors' eye-strain is vastly relieved. Beyond these practical results, the students' sense of a professionally acceptable form is enhanced.

4. Ability to store written material. Using their own disks, as they would cassette tapes, students can keep on file what they have already written. This capability permits leaving and returning to the writing exercise, referring later to material written earlier, and building a research file that can be quickly retrieved. We see this quality as a particular aid to the process of writing research papers.

5. Alternatives for learning disabled students. We have had success in using computer-composing with learning disabled students. One student, in particular, was able to compensate for his particular dyslexic problem by writing and editing on the micro-screen. In his words, "(the microcomputer) assisted me in overcoming a learning disability in English....My grade in English went from a C- to a B+...all my other courses became A's". (Dave Chapman, Wilderness Recreation student)

6. Vocabulary and grammar exercises. As support to our writing courses, these kinds of exercises have been occasionally helpful. Also, a cooperative

effort between English faculty and occupational program faculty has enabled us to assist vocational education students with the special vocabulary and terminology requirements of their fields (e.g., Criminal Justice or Biological Laboratory Technology). Another application here is instruction in reading speed and efficiency. Our reading specialist has found CAI very useful.

It should be mentioned that in this general area, software availability is clearly limited. The need for vocabulary, sentence building, and grammar software that will increase literacy skills for college students is evident. It is a pioneer's field.

A large part of the success we have had with CAI in reading and writing instruction is due to the excitement that surrounds the technology. When we tell our composition classes that they will be learning to write on the computer, faces visibly brighten. There is a hum of excitement and anticipation. In large measure, the anticipation has been met by successful, tangible results. Specifically, our students are writing better, and reading more efficiently and effectively, because of our applications of the microcomputer.

A final benefit worth mentioning here is that our composition students, while learning how to write on the machine, have learned some of the basics of computer literacy. Now we have come full circle. Computer literacy efforts at the college have encouraged us to experiment with literacy through computers; now literacy through computers promotes more widespread computer literacy. Wherever one starts on the circle, students seem certain to gain important skills.

Computer Literacy as a Graduation Requirement

A group of the college's faculty is now in the process of developing

a proposal that will put forth the concept of "computer literacy" as a requirement for graduation from North Country Community College.

While the specific objectives have not been detailed as of this date, the following general components will be part of the computer literacy competencies that an individual will have to show that she/he understands:

1. A basic set of computer terms that will allow the individual to understand computers and be able to be a reasonably informed consumer when having to evaluate the capabilities of various pieces of equipment.

2. How to access and use microcomputers and their accessories.

3. How to use a number of software programs to perform tasks that have meaning to one's program of study and career goals.

It is the contention of those developing the proposal that the above competencies are the minimum that an individual should have to be able to be competitive in the job market and be a literate member of society. When one analyzes the level of use of computers in the world of work today, it is easy to see that the addition of a low cost, easy to use personal/microcomputer in almost any field of employment will make the above-mentioned competencies not only desirable so individuals can be competitive in getting jobs, but in the near future, one can easily envision that employers will consider computer literacy to be as essential as any other communication skill.

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